ORIGINAL

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of 1998 Biennial Regulatory Review - Amendment of Part 18 of the Commission's Rules to Update Regulations for RF Lighting Devices	)))))	ET Docket No. 98-42

COMMENTS OF AMERICAN MOBILE RADIO CORPORATION

American Mobile Radio Corporation ("AMRC") hereby comments in the above-captioned proceeding, in which the Commission proposes to amend its rules to facilitate the operation of new radio frequency ("RF") lighting devices that would operate in frequencies near AMRC's Satellite Digital Audio Radio Service ("SDARS") system.[1/] AMRC is very concerned that these new lighting devices may cause harmful interference to AMRC's receivers. More information is needed before the Commission can act on its proposal.

In its Notice of Proposed Rulemaking ("*NPRM*"), the Commission seeks comment on newly proposed limits on line-conducted and radiated emissions from high-power RF lighting devices. *NPRM* at paras. 8-13. The Commission specifically seeks comment on whether the non-consumer line-conducted limits in Section 18.307(c) of its rules should be relaxed 10 dB for RF lighting products. In addition, the Commission proposes radiated emissions limits on RF lighting products operating above 1 GHz that are identical to the limits already in place for digital devices in Section 18.305(c) of the Commission's rules: a limit of 100 microvolts per meter for non-consumer equipment and 50 microvolts per meter for consumer equipment. The

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1/ AMRC, one of two SDARS licensees that will operate in the S-band, is licensed to provide service in the 2332.5-2345 MHz frequency band.

Commission asks whether these limits are adequate to protect against interference to other communications services, and what effects these limits might have on the development of RF lighting technology.

The Commission should institute standards that ensure that operation of RF lighting devices does not produce harmful interference to SDARS systems. Any such standard must take into account the vast number of microwave lighting devices that will likely enter the RF environment, the density of their deployment, and their proximity to other RF equipment, such as SDARS receivers. As the Commission notes in the *NPRM*, RF lighting is intended for use in large outdoor including parking lots and streets. *NPRM* at paras. 8, 13. These lamps will likely be clustered in many areas, so that particularly at night several such lights will be in operation close to the antennas of SDARS receivers installed on car rooftops.[2/]

AMRC's own technical analysis shows that the Commission's proposed limits on radiated emissions from RF lighting devices operating above 1000 MHz would be inadequate to prevent destructively high levels of interference to AMRC receivers. *See* Affidavit of Richard Michalik, Stanford Telecom (attached).

It would not be economically feasible for AMRC to modify the design of its receiver in order to accommodate new interference from RF lighting devices. As described in Mr. Michalik's affidavit, there is no inexpensive way for AMRC to design its receivers to filter out the RF lighting emissions.

2/ Currently, microwave ovens are the most significant potential sources of interference to SDARS. Microwave ovens are operated within homes; however, their use is intermittent, and they are rarely operated in clusters. In addition, unlike emissions from RF lighting devices, emissions from microwave ovens will suffer some propagation loss due to these ovens' location within enclosed structures.

In contrast, it appears likely that RF lighting manufacturers may be able to effectively reduce their out-of-band emissions and make their emissions more manageable to others. Mr. Michalik's affidavit describes some of the possible steps that could be taken by RF lighting manufacturers.

Conclusion

AMRC urges the Commission to adopt standards for RF lighting devices that protect users of nearby frequencies from harmful out-of-band emissions.

Respectfully submitted,

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AFFIDAVIT OF RICHARD MICHALIK

1. I am Vice President, Engineering, Microwave Systems at Stanford Telecom. In that capacity, I have been working on the development of an S-band radio for American Mobile Radio Corp. I have reviewed the Commission's Notice of Proposed Rulemaking in ET Docket No. 98-42 and analyzed the potential impact on AMRC of out-of-band emissions from the proposed RF lighting.

2. My analysis indicates that the proposal would have a substantial harmful impact on AMRC's system. The proposed field strength limits above 1000 MHz will induce destructively high levels of interference in the AMRC receiver. The field strength limits proposed for non-consumer equipment is 100 μV/m at 30 meters. It is assumed that non-consumer equipment includes street lights that could be placed on any telephone pole, far closer to a car rooftop antenna than 30 meters. The allowable field strength is equivalent to a power flux density of -105 dBw/m^2. (The power flux density is calculated by squaring the field strength and dividing by 377.) The power flux density produced by the AMRC signal is -96 dBw/m^2. Thus, the proposed field strength limits for the RF lighting devices are only 9 dB below the signal level of the AMRC DARS and will be way above the noise floor of the receiver. RF lighting devices have the potential of interfering with the reception of the audio broadcasts whenever a DARS receiver is in the proximity of the lighting device.

3. The harmful impact is worsened by the potential proliferation of new interference sources, the possibility that there would be multiple sources, and the likely proximity of the sources to the antennas of AMRC customers.

4. AMRC's prior studies showed that residential microwave ovens form the major existing source of interference for radios in the 2320 to 2345 MHz region. Commercially viable receivers are planned to have a receive antenna, followed by a low-noise amplifier (LNA) with a combined gain in the 22 to 32 dB region. While the antenna will offer some out-of-band rejection to the 2400 to 2500 ISM band interferers, it cannot be practically designed to have high levels of ISM signal rejection. It is also not easy to position a separate passive bandpass filter between the antenna and the LNA. This is because a commercially viable (less than $3 cost) bandpass filter will have significant insertion loss (2 to 3 dB). That 2 to 3 dB of insertion loss will directly degrade the receiver's noise figure. It is impractical to increase satellite transmit power by 2 to 3 dB due to the exorbitant cost. Also, it is impossible to have more antenna directivity since the proposed placement of these lights will position them directly in the antennas main beam reception pattern.

5. An additional problem may be created by the electrical wire supplying AC power to the lighting, which will likely have a standing wave of 2450 MHz power. This wire may be at any location, including directly adjacent to automotive roof tops. The standing wave will reradiate the power.

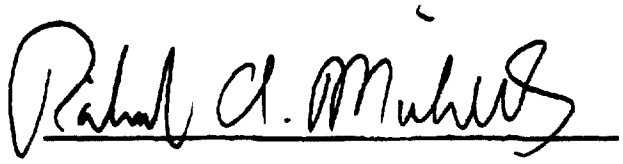
6. Fusion proposes to use a wide operating band of 2400-2500 MHz band, which makes it technically difficult to provide bandstop filtering in AMSC's receivers. The Fusion device must be designed and tested so that the lighting devices operate only within this frequency band. If there is a chance that the devices will operated outside of this band, due to aging or

environmental effects, then the band of allowable frequency operation should be tightened. If the allowable frequency of operation were tightened, to perhaps 2425-2475 MHz, it would be twice as easy to build stop-band filtering that would partially mitigate this interference source. Also, if it is possible for such a lighting device to drift out of the ISM frequency band, due to aging or environmental effects, then the device operating band must be reduced. If, for example, 30 MHz of aging and drift is the maximum expected, then the as-shipped operating frequency should be 2430-2470 MHz respectively.

8. I disagree with Fusion's claim that conducted emissions cannot be effectively reduced. The line filter required to suppress such emissions could be easily fabricated out of passive capacitively coupled quarter wave stopband transmission lines, or other such commonly used filtering methods. Such methods could easily be designed to operate at above 200 degrees Centigrade while withstanding 2 Kilovolts of AC line voltage. The cost of such a filter could be in the <$1 range.

9. It also should be possible to enclose the entire RF lighting assembly within a perforated bonded metal shield that would greatly reduce radiated RF emissions below the proposed levels while impacting the lighting devices cost and light emission negligibly.

I declare under penalty of perjury that the foregoing is true and correct.



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